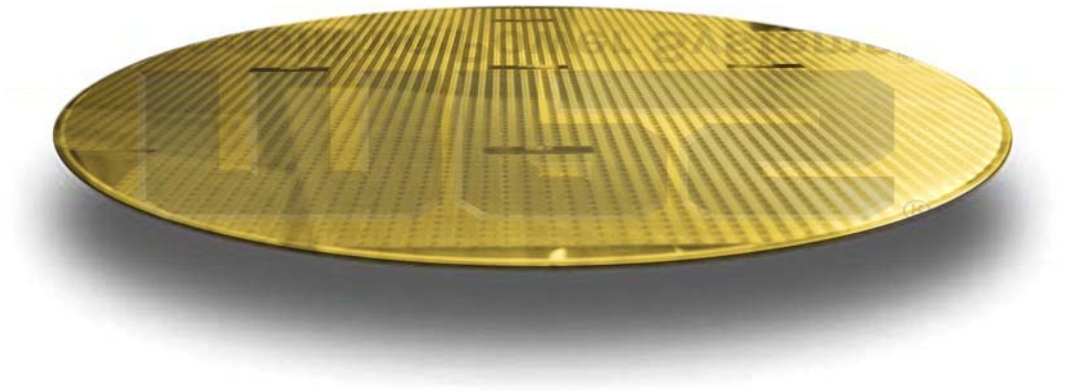
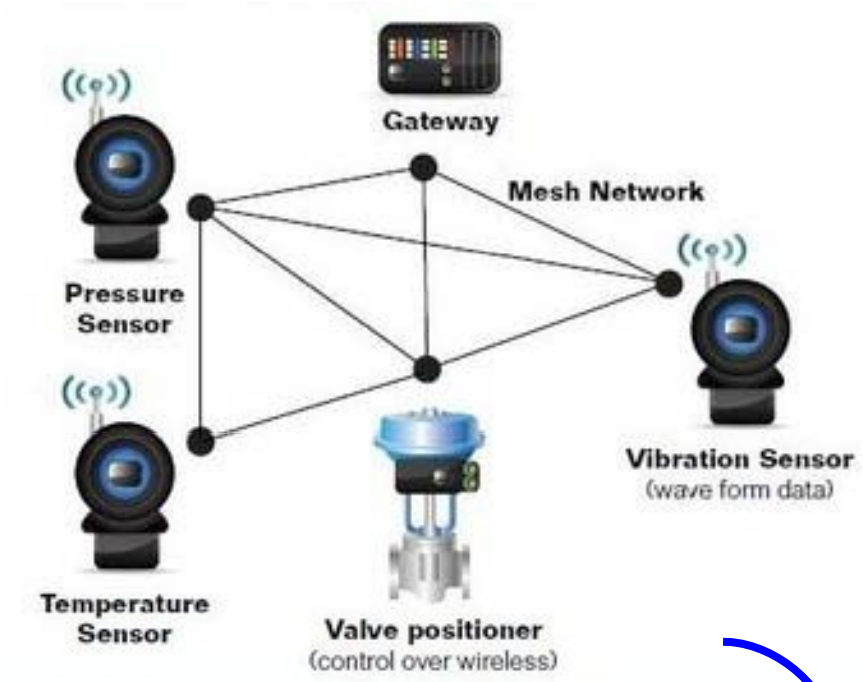
Monolithic Power Systems



超低功耗电源解决传感器供电难题

卢平

2016/3/16



无线传感器网络

如何降低功耗

用电池供电
或
收集微弱能量

10年？

一节1000mAH 的3.6V锂电池如果要持续工作10年，
那么它持续可以提供的电流仅11uA。

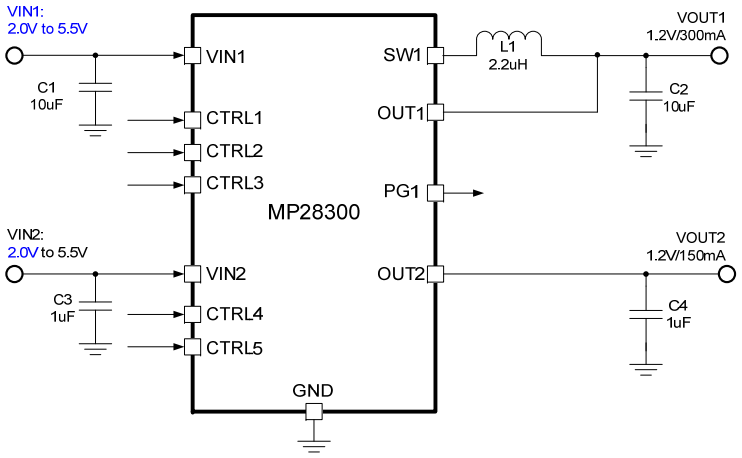
uA级电源芯片

=

nA级电源芯片

=

MPS的 超低功耗开关电源



- 集成1路DC/DC和1路LDO
- DC/DC 500nA 的静态损耗
- LDO 300nA的静态损耗
- 封装仅为 2mm*2mm

MP28300_0.3A/5.5V, 500nA IQ Buck + 300nA IQ LDO in 2x2mm QFN

FEATURES

300mA Buck Switcher:

- Ultra Low IQ: 500nA
- Wide 2.0V to 5.5V Operating Input Range
- 7 Selectable Output Voltages
- 1.5MHz Switching Frequency at CCM Mode
- 100% Duty Cycle in Dropout
- 0.5Ω and 0.4Ω Internal Power MOSFET Switches

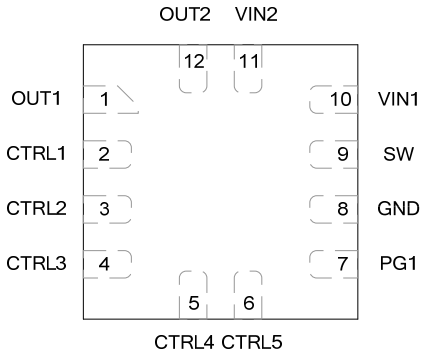
100mA LDO:

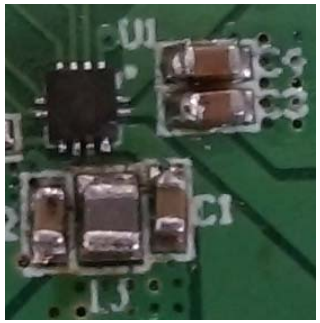
- Ultra Low IQ: 300nA
- 2.0V to 5.5V Operation Input Range
- 3 Selectable Output Voltage

APPLICATIONS

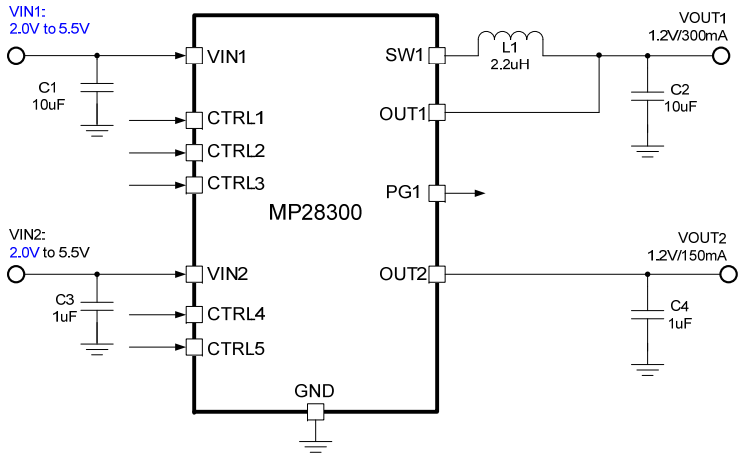
- Wearable Devices
- Portable Instruments
- Battery-Powered Devices

Package:
QFN6-2.0mmx2.0mm

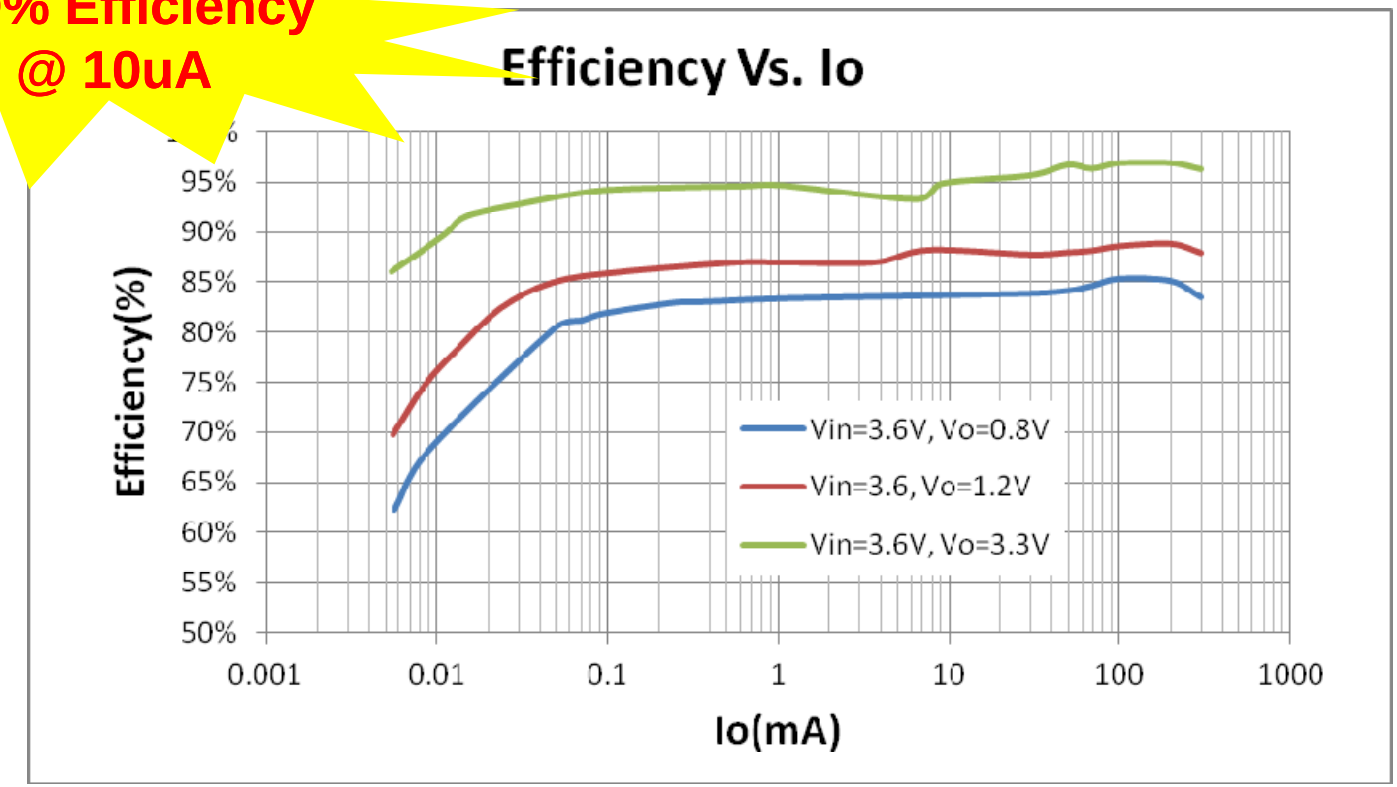




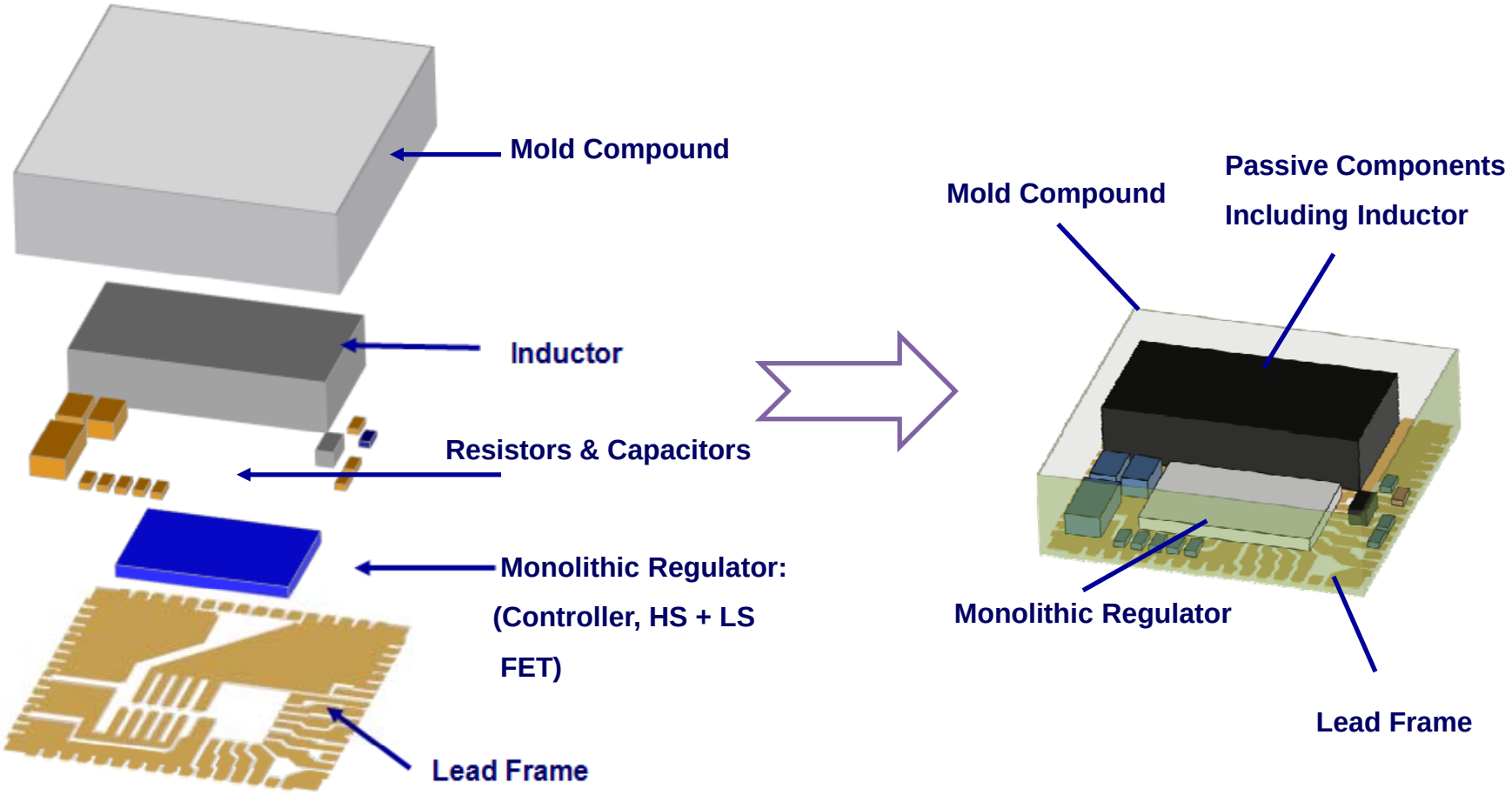
Application Circuit



~90% Efficiency @ 10uA

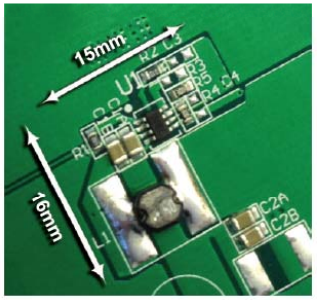


For 3.6V→3.3V operation, only around 3uW power loss at 10uA operation current.


Mold Compound
Inductor
Resistors & Capacitors
Monolithic Regulator:
(Controller, HS + LS
FET)
Lead Frame
Mold Compound
Passive Components
Including Inductor
Monolithic Regulator
Lead Frame

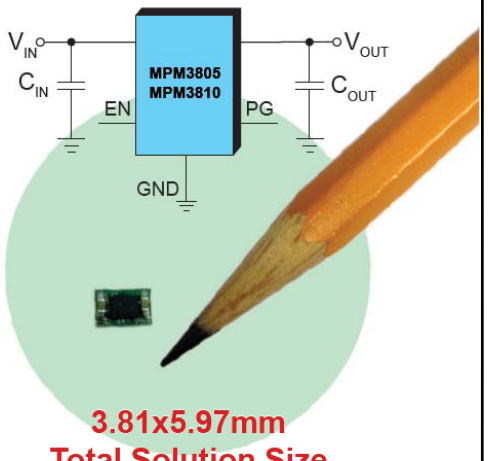
更小，EMI更低

Discrete Solution



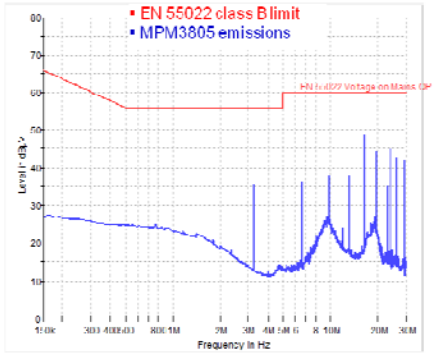
15x16mm
Total Solution Size

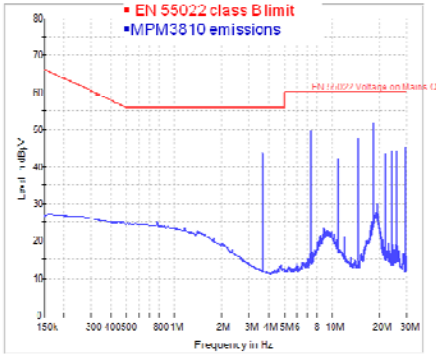
MPS Solution

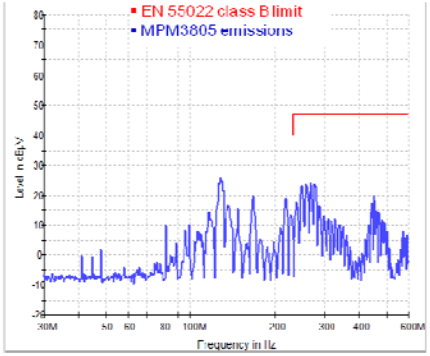


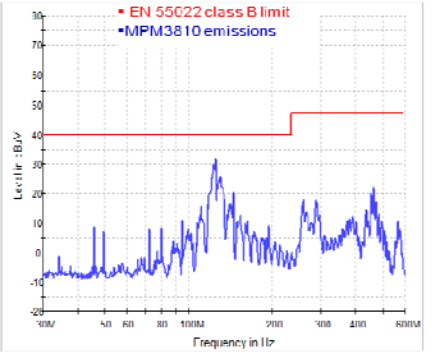
3.81x5.97mm
Total Solution Size

- 更小的体积
- 简便易用









- 低 **EMI**

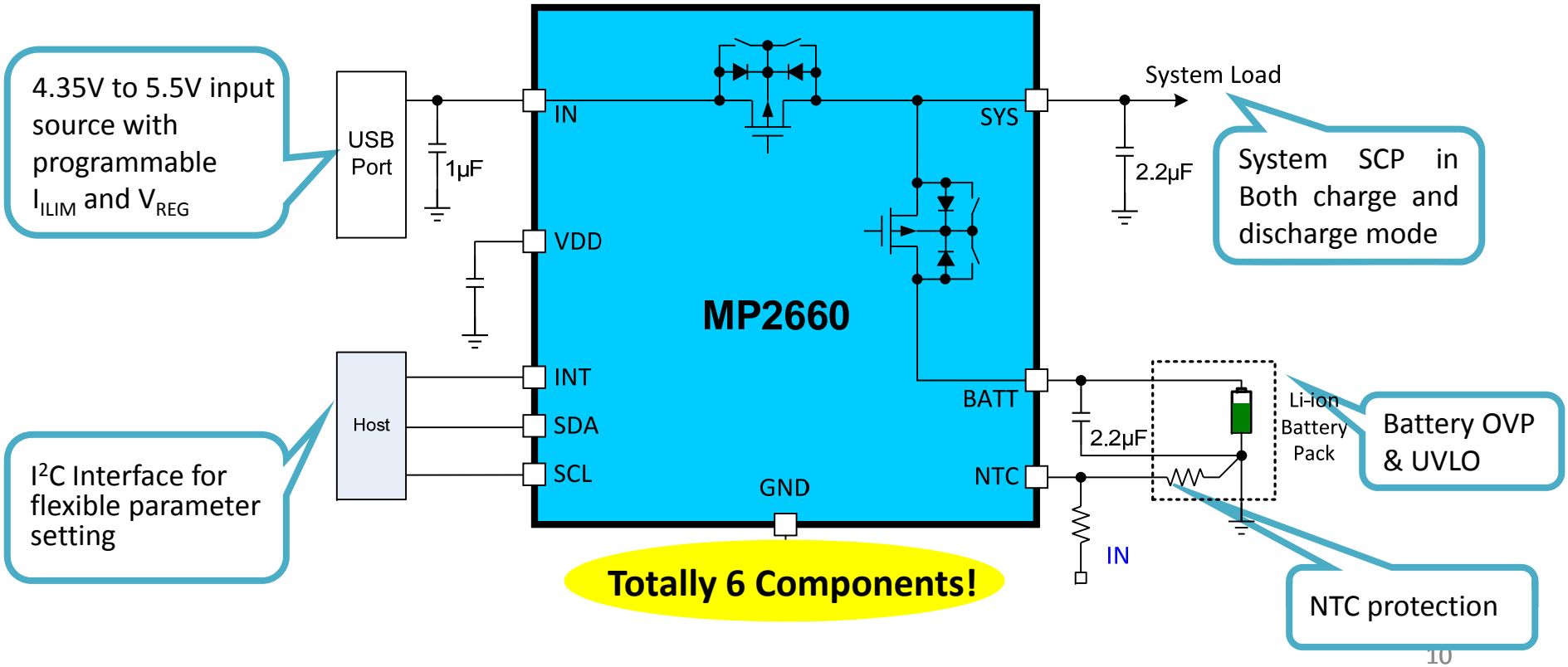
电池充电

电池总容量在100mAH的量级

- 更低的充电截止电流
- 更精确的电流控制
- 超低的漏电流损耗

优点

- 通过I2C可以灵活配置来适应不同的系统要求
- 外围器件极少，节省方案空间和成本



特性

- 单节锂电池或锂离子电池充电器
- 0.5% 充电精度
- 输入可承受12V 电压
- I^2C 控制接口
- 内置Power switch，无需防反的二极管
- 内置电池关断保护，实现更高的电池安全登记

Package: Tiny WCSP
1.55x1.55mm – 9ball

保护项目

- USB输入限流保护
- 充电路径管理
- 12V 耐压
- 输入过电压欠电压保护
- 充电保护：计时器，电池温度检测
- 电池故障断开
- 过温限流功能

MP2660 有5种工作状态